MECHANICAL SYSTEMS DATA SHEET: VESSEL

PLANT ITEM No. 24590-HLW-MV-HOP-VSL-00903

R10550706

Project:	RPP-WTP	P&ID:	24590-HLW-M6-HOP-P0006 & 24590-HLW-M6-HOP-P0004
Project No:	24590	Process Data Sheet:	Deleted 2
Project Site:	Hanford	Vessel Drawing	24590-HLW-MV-HOP-P0001
Description:	SBS Condensate Receiver Vessel 2		

ISSUED BY RPP-WTP PDC

Reference Data

Charge Vessels (Plant Item Numbers)	HOP-VSL-00004A|B, HOP-VSL-00101A|B
Pulsejet Mixers / Agitators (Plant Item Numbers)	HOP-PJM-00001, HOP-PJM-00002, HOP-PJM-00003, HOP-PJM-00007
RFD(s)/Pump(s) (Plant Item Numbers)	HOP-RFD-00001A|B, HOP-RFD-00002A|B

Design Data

Quality Level		QL-2 2	Fabrication Specs	24590-WTP-3PS-MV00-TP001 2		
Seismic Category		SC-III 2	Design Code	ASME VIII Div 1		
Service/Contents		Liquid Acidic Condensate	Code Stamp	Yes		
Design Specific Gravity		1.098	NB Registration	Yes		
Operating Volume	gal	8199 (Note 5)	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	9891 (Note 5)	Estimated	37,900	111,000	121,000
			Actual *	42,810 2	116,070 2	134,470 2

Inside Diameter	inch	144			Wind Design	N/A	
Length/Height (TL-TL)	inch	93			Snow Design	N/A	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	24590-WTP-3PS-SS90-T0001 24590-WTP-3PS-MV00-TP002	
Internal Pressure	psig	Atm	15	65	Seismic Base Moment *	ft*lb	
External Pressure	psig	1.8	FV	FV	Postweld Heat Treat	Not Required	
Temperature	°F	122	165	165	Corrosion Allowance	Inch	0.08 Shell / 0.04 Jacket
Min. Design Metal Temp.	°F	40			Hydrostatic Test Pressure *	Psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED
PROFESSIONAL ENGINEER
4/7/05

EXPIRES 12/10/06

This Bound Document Contains a total of 8 Sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
2	4/7/05	Issued for Permitting Use	J. Jackson	S. Lee	C. Slater	M. Hoffmann
1	6/4/03	Issued for Permitting Use	J. Jackson	S. Lee	C. Slater	M. Hoffmann
0	9/19/02	Issued for Permitting Use	J. Jackson	C. Slater	N/A	S. Kirk

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-HLW-MV-HOP-VSL-00903

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SB-575 N06022***	***See drawing***	***Auxiliary (Note 1)*** 2
Shell	***SB-575 N06022***	***See drawing***	***Primary (Note 1)*** 2
Bottom Head	***SB-575 N06022***	***See drawing***	***Primary (Note 1)*** 2
Support	***SA-240 304L***	***See drawing***	***N/A (100% RT long seams)***
Jacket/Coils/Half-Pipe Jacket	***SA-240 316L***	***See drawing***	***N/A*** 2
Internals (incl. nozzle necks)	***SB-575 N06022 / SB-622 N06022***	***See drawing***	***Thermocouples Primary (Note 1)*** 2
Pipe (Internal / Jacket)	***SB-622 N06022 / SA-312 TP316L***	***See drawing***	***Note 1***
Forgings/ Bar stock (Vessel / Jacket)	***SB-564 N06022 / SA-182 F316L***		***Note 1*** 2
Gaskets	***None***		***N/A*** 2
Bolting	***None***		***N/A*** 2

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***None***	Insulation Material	***N/A***
Insulation Thickness (inch)	***N/A***	Internal Finish	***Note 2*** 2
		External Finish	***Note 2*** 2

Remarks

**** To be determined by the vendor.***

Note 1: All welds forming part of the primary and auxiliary containments, including the nozzle attachment welds shall be subjected to 100% volumetric examination. Radiography is the preferred method of volumetric testing. If it is considered impractical to perform radiographic examination, the Seller may propose ultrasonic examination. 2

Note 2: All welds descaled, as-laid. 2

Note 3: Normal Operating Temperature is 122 °F, Maximum Temperature is 140 °F.

Note 4: Deleted. 2

Note 5: Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals. 2

Note 6: Deleted. 2

Note 7: Contents of this document are Dangerous Waste Permit affecting. 2

Note 8: This vessel is located in a Black Cell. 2

Note 9: The summary of the hydrodynamic forces for the fatigue case are as follows: 2

Summary of Hydrodynamic Forces for Normal PJM Operation (Fatigue) Case: 2

The peak loads given below are calculated based on velocity time histories generated using the CFD model of the SBSCV vessel for PJM drive flow of about 8 m/s. Force time histories were developed (e.g. see Figure 1) but the results given below are peak force summaries only.

1) Radial Direction - Peak Forces on Piping (Sch 40) below PJM Nozzle Level:

Pipe Diameter	Peak Positive Force/length	Peak Negative Force/length
inches	lbf/ft	lbf/ft
6	50	40
4	23	18
2	7	5
1	3	3

2) Radial Direction - Peak Forces on Piping (Sch 40) above PJM Nozzle Level:

Pipe Diameter	Peak Positive Force/length	Peak Negative Force/length
inches	lbf/ft	lbf/ft
6	3.0	1.0
4	1.5	0.5
2	0.4	0.2
1	0.1	0.1

3) Radial Direction - Charge Vessel Peak Force = 150 lbf

4) Radial Direction - PJM Peak Force = 200 lbf

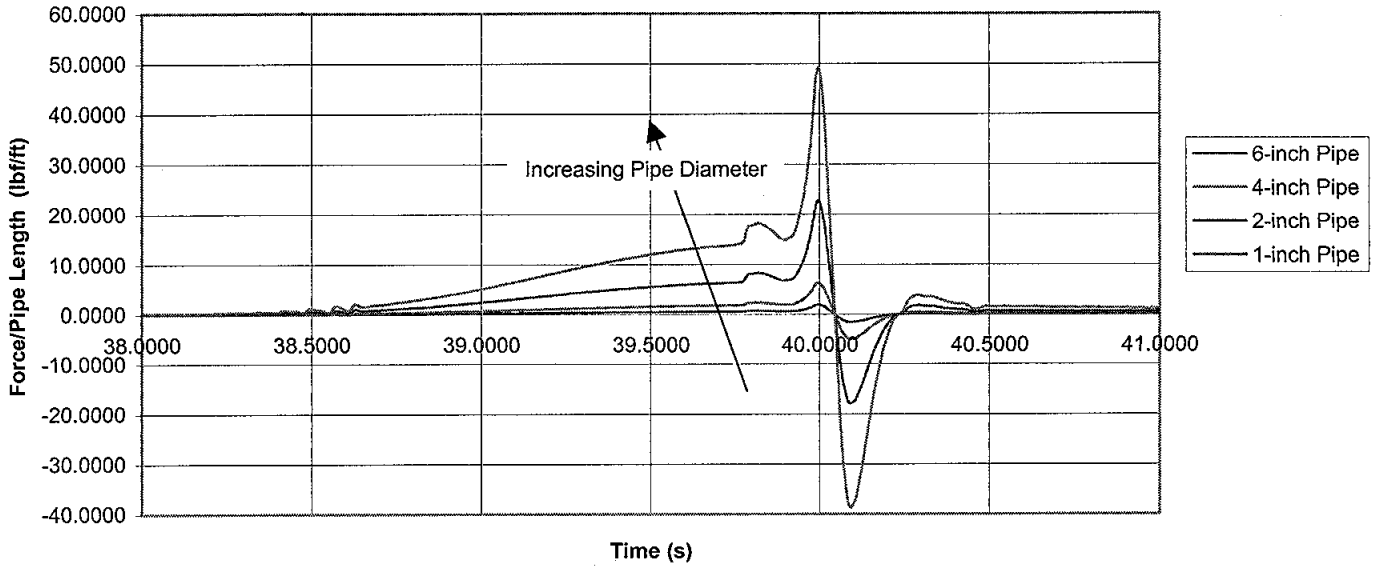
5) Axial (Vertical) Direction - Charge Vessel Peak Force = 70 lbf

6) Axial (Vertical) Direction - PJM Peak Force = 70 lbf

7) Axial (Vertical) Direction – Peak Forces on Horizontal Piping (Sch 40)

Pipe Diameter	Peak Positive Force/length	Peak Negative Force/length
inches	lbf/ft	lbf/ft
6	28	6
4	13	4
2	4	1
1	1	0

Figure 1: Total Drag Loads per PJM Cycle at Monitor Point 20 Below PJM Nozzle Level - Radial Direction



Note 10: The Hydrodynamic loads given in Note 9 are bounding loads. 2

Note 11: This Vessel was procured as Quality Level 1 and Seismic Category I. 2

Note 12: The changes implemented by Revision 2 of this data sheet are for BNI use only. 2

1	**EQUIPMENT CYCLIC DATA SHEET**			
2	Plant Item Number:	24590-HLW-MV-HOP-VSL-00903		
3	Plant Item Description	SBS Condensate Receiver Vessel		
4	Component	**Vessel**		
5		*The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data or requirement.*		
6				
7	Materials of Construction	SB-575 N06022 △2		
8	Design Life	40 years		
9	Component Function & Life Cycle Description	This is a 'head' tank. It normally operates full. HOP-RFD-00001A/B & HOP-RFD-00002A/B discharge liquid during normal operation and equal volumes of liquid are received by the vessel. The vessel is emptied once a day. Washdown is once per year.		
10	Associated Equipment	Jacket, HOP-PJM-00001, HOP-PJM-00002, HOP-PJM-00003, HOP-PJM-00007 and HOP-VSL-00004A/B, HOP-VSL-00101A/B		
11				
12	**Load Type**	Quantity	Number of Cycles	Comment
13	Design Pressure (+ve/-ve)	15 psig / (FV)	10	Nominal assumption.
14	Operating Pressure (+ve/-ve)	(Atm) / -1.8psi	14235	
15	Operating Temperature (max/min)	122° F / 59° F	14235	Pressure cycles to be at 122° F. This is a uniform material temperature range, not between adjacent points.
16	Contents SG (min/max)	1.000 / 1.098	14235	
17	Contents Level	Empty / Flooded	14235	Coincident with pressure cycles.
18				
19				
20	**Localized Features**			
21	Nozzles			
22	All nozzles	Within 50° F of vessel temperature.	As above.	
23				
24				
25				
26				
27	NOTES. • Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted. • CVs inside parent vessels shall have buoyancy effects considered. PJMs shall be similarly considered and also the liquid thrust effect. See the Specification for Pressure Vessel Design and Fabrication, 24590-WTP-3PS-MV00-TP001. △2 • Fatigue environmental effects assumed negligible.			

1	**EQUIPMENT CYCLIC DATA SHEET**			
2	Plant Item Number:	24590-HLW-MV-HOP-VSL-00903		
3	Plant Item Description	SBS Condensate Receiver Vessel		
4	Component	**Jacket**		
5		*The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data or requirement.*		
6				
7	Materials of Construction	ASME SA240 316L		
8	Design Life	40 years		
9	Component Function & Life Cycle Description	The jacket provides a cooling duty with cold water when the vessel is in service. *Provisional assumption is shutdown once a day.*		
10	Associated Equipment	24590-HLW-MV-HOP-VSL-00903		
11				
12	**Load Type**	Quantity	Number of Cycles	Comment
13	Design Pressure (+ve/-ve)	65 psig / (FV)	10	Nominal assumption.
14	Operating Pressure (+ve/-ve)	60 psig / (FV)	14235	
15	Operating Temperature (max/min)	122° F / 59° F	14235	Pressure cycles to be at 122° F. This is a uniform material temperature range, not between adjacent points.
16	Contents SG (min/max)	1.000	N/A	
17	Contents Level	Empty / Flooded	13	*3 year maintenance period assumed*
18				
19				
20	**Localized Features**			
21	Nozzles			
22	All nozzles	Within 50° F of vessel and jacket temperatures.	As above.	
23				
24				
25				
26				
27	NOTES. • Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted. • Fatigue environmental effects assumed negligible.			

1	**EQUIPMENT CYCLIC DATA SHEET**			
2	Plant Item Number:	(Parent) 24590-HLW-MV-HOP-VSL-00903		
3	Plant Item Description	SBS Condensate Receiver Vessel		
4	Component	**Charge Vessel** HOP-VSL-00004A/B, HOP-VSL-00101A/B		
5		*The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data or requirement.*		
6				
7	Materials of Construction	SB-575 N06022 △2		
8	Design Life	40 years		
9	Component Function & Life Cycle Description	This component is part of a pumping system. It repeatedly floods and empties. The action is caused by vacuum or air pressure being presented to the top nozzle. The surrounding parent vessel may contain any level of the fluid between the maximum operating level and the heel level. The charge vessel is subjected to buoyancy forces when immersed in the parent vessel contents. The vessel is in cyclic duty.		
10	Associated Equipment	See parent vessel MDS details.		
11				
12	**Load Type**	Quantity	Number of Cycles	Comment
13	Design Pressure (+ve/-ve)	32 psig / (FV)	10	Nominal assumption.
14	Operating Pressure (+ve/-ve)	29 psig / (FV)	2.1×10^7	
15	Operating Temperature (max/min)	122° F / 59° F	14235 △2	Pressure cycles to be at 122° F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points. Typically washdown 1/year and shutdowns = 13.
16	Contents SG (min/max)	1.000 / 1.098	14235 △2	
17	Contents Level	Empty / Flooded	2.1×10^7	Coincident with pressure cycles.
18				
20	**Localized Features**			
21	Nozzles			
22	Air Inlet	As above	As above including pressure cycles.	
23	Delivery	As above	As above including pressure cycles.	
24	Supports	As above	As above with contents level changing coincident with pressure cycle. Floatation on parent vessel contents level frequency.	
25				
26				
27	NOTES. • Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted. • CVs inside parent vessels shall have buoyancy effects considered. PJMs shall be similarly considered and also the liquid thrust effect. See the Specification for Pressure Vessel Design and Fabrication, 24590-WTP-3PS-MV00-TP001. △2 • Fatigue environmental effects assumed negligible.			

1	**EQUIPMENT CYCLIC DATA SHEET**			
2	Plant Item Number:	(Parent) 24590-HLW-MV-HOP-VSL-00903		
3	Plant Item Description	SBS Condensate Receiver Vessel		
4	Component	**Pulse Jet Mixer** (vessel) HOP-PJM-00001, HOP-PJM-00002, HOP-PJM-00003, HOP-PJM-00007		
5		*The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data or requirement.*		
6				
7	Materials of Construction	SB-575 N06022 △2		
8	Design Life	40 years		
9	Component Function & Life Cycle Description	This component is part of a mixing system. It repeatedly floods and empties. The action is caused by vacuum or air pressure being presented to the top nozzle. The surrounding parent vessel may contain any level of the fluid between the maximum operating level and the heel level. The vessel is subjected to buoyancy forces when immersed in the parent vessel contents. The vessel is in cyclic duty.		
10	Associated Equipment	See parent vessel MDS details.		
11				
12	**Load Type**	Quantity	Number of Cycles	Comment
13	Design Pressure (+ve/-ve)	80 psig / (FV)	10	Nominal assumption.
14	Operating Pressure (+ve/-ve)	58 psig / (FV)	4.2×10^7	
15	Operating Temperature (max/min)	122° F / 59° F	14235 △2	Pressure cycles to be at 122° F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points. Typically washdown 1/year and shutdowns = 13.
16	Contents SG (min/max)	1.000 / 1.098	14235 △2	
17	Contents Level	Empty / Flooded	4.2×10^7	Coincident with pressure cycles.
18	Thrust Load (lb) △2	252	4.2×10^7	See Note below
20	**Localized Features**			
21	Nozzles			
22	Air Inlet	As above	As above including pressure cycles.	
23	Delivery	As above	As above including pressure cycles.	
24	Supports	As above	As above with contents level changing coincident with pressure cycle. Floatation on parent vessel contents level frequency.	
27	NOTES. • Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted. • CVs inside parent vessels shall have buoyancy effects considered. PJMs shall be similarly considered and also the liquid thrust effect. See the Specification for Pressure Vessel Design and Fabrication, 24590-WTP-3PS-MV00-TP001. △2 • Fatigue environmental effects assumed negligible. • Thrust loading should be ignored when considering deadweight loading of PJM with empty parent vessel, and should only be applied when considering buoyancy loading of PJM with full parent vessel. Assume parent vessel to be full for 50% of stated number of PJM cycles. △2			